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CITY OF WISCONSIN DELLS

Michael T. Horkan Director of Public Works City Engineer

January 30, 2001

Jim Loock, Chief Electric Engineer Public Service Commission 610 N. Whitney Way P.O. Box 7854 Madison, WI 53707-7854

RE:

In the Matter of Filing Plans for Appropriate Inspection and

Maintenance, PSC Rule 113.0607.

Dear Mr. Loock:

Enclosed for filing are 3 copies of Wisconsin Dells Water and Light Utility's Preventative Maintenance Plan detailing inspection maintenance schedules, condition rating criteria, corrective action schedules, record keeping procedures and report filing schedules as documented in this rule.

Very truly yours,

Michael T. Horkan

Director of Public Works/City Engineer

Michael T. Horkon

City Of Wisconsin Dells

Enclosures Preventative Maintenance Plan (3)

MTH

RECEIVED

JAN 3 1 2001

Electric Division

PREVENTATIVE MAINTENANCE PLAN

Wisconsin Dells Water and Light Utility

FILING DEADLINE FEBRUARY 1, 2001

December 19, 2000

Michael T. Horkan 300 LaCrosse Street Wisconsin Dells, WI. 53965 608-253-2542 ext. 407 MHORKAN@DELLSNET.COM

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Electric Division

This plan was prepared by the MEUW work group for PSC Rule 113.0607 for use by the 82 municipal electric utilities in Wisconsin and endorsed by PSC staff as meeting the requirements of Rule PSC 113.0607.

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I. Preventative Maintenance Plan

The PSC 113.0607 rule reads;

Appropriate inspection and maintenance: system reliability.

- (1) PREVENTATIVE MAINTENANCE PLAN. Each utility or other person subject to this chapter, including persons who own electric generating facilities in this state who provide service to utilities with contracts of five years or more, shall develop and have in place its own preventative maintenance plan. This section is applicable to electric generating facilities as set forth at s. 194.491(5)(a)(1), Stats. Each plan shall include, among other things, appropriate inspection, maintenance and replacement cycles where applicable for overhead and underground distribution plant, transmission, generation¹, and substation facilities.
- (2) CONTENTS OF THE PLAN. (a) *Performance standard*. The Preventative Maintenance Plan shall be designed to ensure high quality, safe, and reliable service, considering: cost, geography, weather, applicable codes, national electric industry practices, sound engineering judgment and experience.
- 1 PSC staff interpretation is that generation applies to individual generators equal to or greater than 50 MW.

II. Inspection Schedule and Methods:

The purpose of this plan is to maintain or improve the electrical system reliability with the objective of increased municipal loyalty and satisfaction from our constituents. The goals are to meet and exceed the schedules established in this plan.

Exception reporting (inspected equipment not in good condition) will be the method of documentation on all inspection forms.

The scope of this plan is traditional and uses proven maintenance techniques. Unique operating and maintenance philosophies have not been considered. Also, manufacturer defects will be dealt with as they are communicated to this utility.

EVERY

SCHEDULE:	MONTHLY	ANNUAL	5 YEARS
Transmission (69Kv and above)		X	X
Substations	X	X	
Distribution (OH & UG)			X

The inspection of Distribution facilities will be by individual substation circuits on a 5-year cycle such that the entire system will be inspected every 5 years. Inspector instructions for inspecting all facilities and forms are included with the plan.

METHODS: Five criteria groups will be used to complete the inspection of all facilities.

- 1. <u>IR</u> infrared thermography used to find poor electrical connections and/or oil flow problems in equipment.
- 2. <u>RFI</u> Radio Frequency Interference, a byproduct of loose hardware and connections, is checked using an AM radio receiver.
- 3. <u>SI</u> structural integrity of all supporting hardware including poles, crossarms, insulators, structures, bases, foundations, buildings, etc.
- 4. <u>Clearance</u> refers to proper spacing of conductors from objects, trees and other utility cables.
- 5. <u>EC</u> equipment condition on non-structural components such as circuit breakers, transformers, regulators, reclosers, relays, batteries, capacitors, etc.

III. Condition Rating Criteria:

This criterion, as listed below, establishes the condition of a facility and also determines the repair schedule to correct deficiencies.

- 0) Good condition
- 1) Good condition but aging
- 2) Non-critical maintenance required normally repair within 12 months
- 3) Priority maintenance required normally repair within 90 days
- 4) Urgent maintenance required report immediately to the utility and repair normally within 1 week

IV. Corrective Action Schedule

The rating criteria as listed above determine the corrective action schedule.

V. Record Keeping

All inspection forms and records will be retained for a minimum of 10 years. The inspection form contains all of the required critical information i.e. inspection dates, condition rating, schedule for repair and date of repair completion.

VI. Reporting Requirements

A report and summary of this plan's progress will be submitted every two years with the first report due to the Commission by February 1, 2003. The report will consist of a letter documenting the percent of inspections achieved compared to the schedule and a description of maintenance achieved within the scheduled time allowance.

VII DISTRIBUTION – OVERHEAD INSPECTION GUIDE

STRUCTURE

- Pole Condition
- Pole Leaning
- Crossarm Condition
- Insulators, Deadend, Pin
- Excess Fill or Soil Removal
- Pole Steps
- Grounds Intact
- Ground Molding
- Down Guys
- Guy Markers
- Guy Bonding/Insulator
- Signage Location Number, Warning Sign
- Customer Equipment
- Conductor
- Tie Wires
- U Guard/Conduit Condition

EQUIPMENT

- Transformers
 - ✓ Oil Leaks
 - ✓ Bushing Condition
 - ✓ Grounding/Bonding
- Capacitors
 - ✓ Fuses Blown
 - ✓ Bushing Condition
 - ✓ Oil Leaks
 - ✓ Tank Bulged
 - ✓ Switches, Oil, Vacuum
 - ✓ Control Conduit/Wiring
 - ✓ Grounding/Bonding
- Switches GOAB, Inline, Disconnect
 - ✓ Insulator Condition
 - ✓ Operating Handle/Locks
 - ✓ Linkage
 - ✓ Grounding/Bonding
 - ✓ Switch Number
- Cutouts
 - ✓ Insulator Condition
 - ✓ Fuse Size Tag

VII DISTRIBUTION - OVERHEAD INSPECTION GUIDE (con't)

EQUIPMENT (CON'T)

- Arrestor
 - ✓ Insulator Condition
 - ✓ Connections
 - ✓ Ground Lead Disconnection
- Cable Terminators
 - ✓ Insulator Condition
 - ✓ Grounding/Bonding

CLEARANCES

- Ground Line
- Buildings, Bridges, Swimming Pool, Etc.
- Communications Facilities
- Fuel Tanks
- Other Electric Utilities
- Transmission Lines
- Over Streets, Roads, Alleys, Highways
- Tree Trimming
 - ✓ Clearance From Line
 - ✓ Vines on Poles
 - ✓ Danger Trees

INFRARED SCAN

- Main Three-Phase Feeders
- Priority Overhead Transformer Banks
 - ✓ Bushing Connectors Primary
 - ✓ Bushing Connectors Secondary
 - ✓ General Tank Heating
- Current & Voltage Transformers if Applicable

RFI CHECK

OH system with AM radio as each circuit is inspected

									LOCATION	MAP AREA	OVERHEAL
									Pole Condition/Leaning Crossarm Condition Insulators, DE, Pin Soil Conditions Pole Steps Grounds Intact, Molding	STR	OVERHEAD DISTRIBUTION INSPECTION FORM
									Down Guys and Markers Guy Bond, Insulator Signs, Loc#, Warning Customer Equipment Conductor and Ties U'Guard/Conduit Cond RFI Check	STRUCTURE	INSPECTION F
									Transformer Switches Cutouts Arresters Terminators Street Light	EQUIPMENT	ORM
									Tree Trimming Ground Line Clearances Building Clearances Streets, Roads, Alleys Communication Clearance	CLEARANCE	DateIn
									Rating Criteria O) Good Condition 1) Good Condition but aging 2) Non-critical Maintenance Required 3) Priority Maintenance Required 4) Urgent Maintenace Required	COMMENTS	Inspected by Sub
			 						Date Item Corrected		
							:		Corrected By		

VIII DISTRIBUTION – UNDERGROUND INSPECTION GUIDE

STRUCTURAL (Exterior & Interior) Transformer, Primary Pedestal, Secondary Pedestal, Switchgear.

- Enclosure Condition
- Level/Leaning
- Security
- Grade/Accessibility (Shrubs, Customer Facilities, Fill/Excavation)
- Numbering
- Voids/Gaps
- Signage Location Number, Warning Sign
- Pad/Vault Condition

EQUIPMENT

- Transformers
 - ✓ Oil Leaks
 - ✓ Bushing Condition
 - ✓ Grounding/Bonding
 - ✓ Elbows
 - ✓ Arrestors
 - ✓ Feed-Through
 - ✓ Cable Condition
 - ✓ Secondary Connections
- Primary Pedestals
 - ✓ Elbows
 - ✓ Junction Condition
 - ✓ Grounding/Bonding
- Secondary Pedestals
 - ✓ Secondary Connections
- Switches URD Switchgear
 - ✓ Insulator Condition
 - ✓ Operating Handle Security
 - ✓ Linkage
 - ✓ Grounding/Bonding
 - ✓ Switch Number/Fuse Size & Number

INFRARED SCAN and RFI CHECK

- Main Three-Phase Feeders (Risers & Switchgear)
- Priority URD Transformer Banks
 - ✓ Bushing Connectors Primary
 - ✓ Bushing Connectors Secondary
 - ✓ General Tank Heating

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UNDERGROUND DISTRIBUTION INSPECTION FORM Date_

Inspected by

Circuit_

IX SUBSTATION - MONTHLY INSPECTION GUIDE

TRANSFORMER MAIN TANK:

- Oil in bushings
- Bushing and arrestor porcelain
 - ✓ Cracks or chips
 - ✓ Rust or dirt
- Oil leaks
 - ✓ Main tank
 - ✓ Sample valves
 - ✓ Radiators
- Radiator bank
 - √ warm on top, cool at bottom
- Tank pressure
- Tank oil level
- Temperature gauge
- Cooling fans

TRANSFORMER LTC or VOLTAGE REGULATORS:

- Tank oil level
- Drag hand positions
- Cabinet light
- Operation count
- Tank pressure
- Cabinet heater
- Cabinet contamination

TRANSMISSION CIRCUIT BREAKERS:

- OPEN/CLOSED indicator
- CHARGED/DISCHARGED indicator
- Cabinet light
- Cabinet heater
- Operations counter
- Bushings and supports
 - ✓ Cracks or chips
 - ✓ Rust or dirt
- Line and load side disconnect switches
 - ✓ Properly labeled
 - ✓ Aligned properly
- Handles grounded
- Emergency trip button
- Air / Oil compressors
- Air / Oil pressure gauge
- Spring operated mechanism
- Oil level gauge
- Tank oil leaks
- Reset switch
- Cabinet contamination
- Vents clean
- Gas pressures for GCBs

IX SUBSTATION - MONTHLY INSPECTION GUIDE (con't)

FEEDER CIRCUIT BREAKERS / RECLOSERS

- OPEN/CLOSED indicator
- CHARGED/DISCHARGED indicator
- Cabinet light
- Cabinet heater
- Operations counter
- Bushings and supports
 - ✓ Cracks or chips
 - ✓ Rust or dirt
- Line and load side disconnect switches
 - ✓ Labeled properly
 - ✓ Aligned properly
 - ✓ Handles grounded
- Emergency trip button
- Oil level gauge
- Tank oil leaks
- Reset switch
- Cabinet contamination
- Vents clean
- Gas pressures for GCBs

HIGH AND LOW VOLTAGE BUSS WORK:

- Bushing, insulator, arrestor, and support insulators
 - ✓ Chips or cracks
 - ✓ Rust or dirt
- Bird nests
- Potential transformers bushings
 - ✓ Cracks or chips
 - ✓ Rust or dirt
- Cable terminators
 - ✓ Leaking fluid
 - ✓ Cracks or chips

MANUAL SWITCHES:

- Properly labeled
- Ground connections
- Positioning and alignment
- Bushing and support insulators
 - ✓ Cracks or chips
 - ✓ Rust or dirt

MOTOR OPERATED SWITCHES:

- OPEN/CLOSED indicator
- Properly labeled
- Cabinet heater
- Operations counter

IX SUBSTATION - MONTHLY INSPECTION GUIDE (con't)

CONTROL HOUSE/MISCELLANEOUS:

- Clock displays proper time
- AC/DC load center breakers
- Room temperature
- Rodents
- Panels labeled properly
- Panel lights
- Annunciator panel
- Panel meters
- SCADA system RTU
- SCADA alarms
- Position indicators agree
- Relay target information
- Emergency contact directory & dial tone for phone
- Safety Equipment

BATTERY:

- Liquid levels
- Proper float voltage on charger and battery
- Specific gravity in pilot cell
- Personal Protective Equipment
- Connection corrosion
- Leaking cells
- Dated solution in eyewash station

YARD AND FENCE:

- Fire extinguisher charged
- Fence ground connections
- Fence secured
- Security and emergency lights
- Site base and grade
- Standing water
- Warning signs

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Oil Leaks					
Main Tank					
Sample Valves					
Radiators					
Radiator Bank					
Tank Pressure					
Tank Oil Level					
Temperature Gauge					
Cooling Fans					
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TRANSFORMER LTC or VOLTAGE REGULATORS		RATING: 0 1 2	3 4	(Circle One)	
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Transformer Bushings					-			
Cable Terminators								
							+	
								
MANUAL SWITCHES		RATING: 0	1	2	3	4	(Circle One)	
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Positioning and Alignment							 	
Bushings and Supports			-					
							 	
							 	
							 	
MOTOR OPERATED SWITCHES		RATING: 0	1	2	3	4	(Circle One)	
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CONTROL HOUSE/MISCELLANEOUS	}	RATING:	0	1	2	3	4	(Circle One)	
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AC/DC Load Center Breakers									
Room Temperature									
Rodents									
Panels Labeled Properly									
Panel Lights									
Annunciator Panel									
Panel Meters									
SCADA System RTU									
SCADA Alarms									
Position Indicators Agree									
Relay Target Information								+	
Emergency Contact Directory & Dialtone for Phone									
Safety Equipment	_								
BATTERY	<u> </u>	RATING:	0	1	2	3	4	(Circle One)	
iquid Levels	T								
Proper Float Voltage on Charger & Battery									
pecific Gravity in Pilot Cell	+								
ersonal Protective Equipment	+								
connection Corrosion	+-								
eaking Cells	+-								
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YARD & FENCE		RATING: () ,	1 2	 2	3	4	(Circle One)	
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e Base and Grade								 -	
anding Water								 	
arning Signs								 	

X Substation - Annual Inspection Guide

- Check equipment for level
- Check condition of concrete pads
- Perform oil and DGA analysis
- Battery
 - ✓ Intercell strap resistance
 - ✓ Individual cell voltages
 - ✓ Cell specific gravity
- Nameplate legible
- Equipment paint condition
- Proper equipment ID labels
- IR / RFI scans and checks

ANNUAL SUBSTATION INSPECTION FORM

Date_

Date		=	spec	Inspected by					Substation		
		ျှ	JBSTA	SUBSTATION INSPECTION CRITERIA	TION C	RITER	Ä		COMMENTS	MAINTE	MAINTENANCE COMPLETED
EQUIPMENT LISTING	Check equipment for level	Check condition of concrete pads	Perform oil and DGA analysis	Battery checks - Intercell strap esistance, Individual cell voltages, Cell specific gravity	lameplate legible	quipment paint condition	roper identification labels	R / RFI scans and checks	Rating Criteria O) Good Condition O) Good Condition O) Honor Condition but aging O) Non-critical Maintenance Required O) Priority Maintenance Required O) Urgent Maintenace Required	ate Item Corrected	prrected By
Transformer		_				ŀ	F	ı		D	C
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High Voltage Breaker		_									
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Switches					_						
Control house hattery											
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XI TRANSMISSION – ANNUAL INSPECTION GUIDE

STRUCTURE

- Pole Condition
- Pole Leaning
- Crossarm Condition
- Insulators, Deadend, Pin
- Excess Fill or Soil Removal
- Pole Steps
- Grounds Intact
- Ground Molding
- Down Guys
- Guy Markers
- Guy Bonding/Insulator
- Signage Location Number, Warning Sign
- Customer Equipment
- Conductor
- Tie Wires

EQUIPMENT

- Switches GOAB, Disconnect
 - ✓ Insulator Condition
 - ✓ Operating Handle/Locks
 - ✓ Linkage
 - ✓ Grounding/Bonding
 - ✓ Switch Number
- Arrestor
 - ✓ Insulator Condition
 - ✓ Connections

CLEARANCES

- Ground Line
- Buildings, Bridges, Etc.
- Communications Facilities
- Fuel Tanks
- Other Electric Utilities
- Over Streets, Roads, Alleys, Highways
- Tree Trimming
 - ✓ Clearance From Line
 - ✓ Vines on Poles
 - ✓ Danger Trees

XI TRANSMISSION - ANNUAL INSPECTION GUIDE (con't)

RFI CHECK

- Splices
- Connectors
- Dead Ends
- Switches
- Structures

XII TRANSMISSION – 5 YEAR INSPECTION GUIDE

IR SCAN

- Splices
- Connectors
- Dead Ends
- Switches

ANNUAL TRANSMISSION INSPECTION FORM

Date_

_ Inspected by_

| | | |

																				LOCATION	MAP AREA
			<u> </u>			_	_		_					\perp						Pole Condition/Leaning	
L	_				_		<u> </u>	_		ļ				<u> </u>					1	Crossarm Condition	
L						<u> </u>	<u> </u>								<u> </u>		<u> </u>			Insulators, DE, Pin	
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	\downarrow	_						<u> </u>												Signs, Loc#, Warning	
L																		L		Customer Equipment	
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